

## Four new and two known species of the family Qudsianematidae (Nematoda: Dorylaimida) from Japan

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Four new and two known species belonging to the family Qudsianematidae Jairajpuri, 1965 are described and illustrated. *Eudorylaimus intermedius* sp. n. is characterized by having 0.76 - 0.84 mm long body; lip region distinctly offset; large amphids; 10 - 11  $\mu$ m long odontostyle; a post-median transverse vulva; distinctly sclerotized *pars refringens vaginae*; ventrally arcuate tail, and males with three to four ventromedian supplements. *E. niaesi* sp. n. has 1.85 - 2.36 mm long, slender body; lip region offset by slight depression; small, stirrup-shaped amphids; 19 - 20  $\mu$ m long odontostyle; distinctly enlarged DN; transverse vulva; spherical vagina with well developed *pars refringens vaginae*; small genital branches, and conoid, ventrally arcuate tail. *E. kyotoensis* sp. n. has 1.90 - 1.96 mm long, slender body; lip region offset by depression with projecting labial papillae; large amphids; 22.5 - 23.5  $\mu$ m long odontostyle; transverse vulva; *pars refringens vaginae* small; well developed genital branches, and conoid, ventrally arcuate tail. *Paraxonchium japonicum* sp. n. has 0.66 - 0.80 mm long, robust body; lip region rounded, distinctly offset; large amphids; 20 - 21  $\mu$ m long, asymmetrical odontostyle with short aperture; pharyngo-intestinal junction with three distinct gland cells; post-median transverse vulva; strongly sclerotized *pars refringens vaginae*; amphidelphic gonad and short, conoid, almost straight tail. *Ecumenicus monohystera* (de Man, 1880) Thorne, 1974 and *Myiodiscus nanus* Thorne, 1939 are reported here for the first time from Japan. Jpn. J. Nematol. 33(1), 23-40 (2003).

Key words: taxonomy, description, new species, new record, dorylaim nematode.

During course of study on dorylaim nematode fauna of Japan, soil samples collected from various localities yielded several populations of nematodes belonging to the family Qudsianematidae Jairajpuri, 1965. On detailed study they were found to represent four new and two known species which are being described and illustrated in the following.

### MATERIALS AND METHODS

The nematodes were extracted from soil samples by Cobb's sieving and decantation and Baermann's funnel technique. Nematodes obtained in clear water were killed and fixed in hot TAF, dehydrated by Seinhorst's rapid glycerine method and mounted on slides in anhydrous glycerine. Measurements were done using an ocular micrometer and drawings were made using a drawing tube attached to the microscope.

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## DESCRIPTIONS

*Eudorylaimus intermedius* sp. n.

(Figs. 1 and 2)

## Measurements:

See Table 1.

## Description:

Female: Body ventrally curved, C-shaped upon fixation, tapering slightly towards both the extremities. Cuticle finely striated, 1.5 - 2.0  $\mu\text{m}$  thick at midbody and 2.0 - 2.5  $\mu\text{m}$  on tail. Lateral chords about one-third of body widths at midbody. Lateral, dorsal and ventral body pores indistinct.

Lip region distinctly offset, wider than the adjoining body, 2.2 - 2.5 times as wide as high and about half as wide as body width at neck base. Lips separate; labial papillae interfering with the labial contour. Amphids large; fovea stirrup-shaped, their aperture occupying almost entire lateral width at that level; fusus 15 - 17  $\mu\text{m}$  behind the aperture. Odontostyle dorylaimoid, about as long as lip region width; its aperture about one-third of its length. Guiding ring single, at 0.46 - 0.52 times lip region width from anterior end. Odontophore rod-like, 1.3 - 1.4 times the odontostyle length. Nerve ring encircling the anterior slender part of pharynx at 37 - 39 % of neck length from anterior end. Pharyngeal expansion gradual; expanded part occupying 38 - 42 % of total neck length. Cardia short, conoid with a thin disc.

Table 1. Measurements (in  $\mu\text{m}$ ) of *Eudorylaimus intermedius* sp. n.

Characters	Holotype female	Paratype females n = 10	Paratype males n = 10
Body length	797	769 - 845 (805)	762 - 844 (799)
Body width at neck base	21.5	20 - 22 (21)	19 - 21 (20)
Body width at midbody	22	21 - 24 (22.5)	20 - 22 (21)
Body width at anus	13	13 - 14 (13.5)	15.5 - 16.5
a	36	33 - 39 (36)	36 - 38 (37)
b	3.7	3.5 - 3.9 (3.7)	3.6 - 4.0 (3.8)
c	19	16 - 19 (17.6)	16.0 - 21.6 (18.4)
c'	3.15	3.1 - 3.9 (3.3)	2.6 - 3.0 (2.8)
V	57	55 - 59 (57)	-
G1	14	11 - 17 (13)	-
G2	13	12 - 16 (13)	-
Lip region width	10.5	9.5 - 10.5 (10.0)	10 - 11
Lip region height	4.5	4.5 - 5.0	4.5 - 5.0
Amphid aperture	6.5	6.5 - 7.0	6.5 - 7.0
Odontostyle length	10	10 - 11	10 - 11
Odontophore length	14	14 - 15	14.0 - 14.5
Guiding ring from ant. end	5	5 - 6	5 - 6
Nerve ring from ant. end	81	74 - 86 (81)	79 - 84 (82)
Neck length	216	197 - 233 (216)	200 - 219 (209)
Expanded part of pharynx	87	82 - 93 (87)	79 - 86 (83)
Anterior genital branch	110	102 - 136 (108)	-
Posterior genital branch	105	99 - 122 (109)	-
Vaginal depth	12	12 - 13	-
Vulva from anterior end	454	446 - 479 (458)	-
Prerectum length	22	22 - 35 (28)	35 - 47 (42)
Rectum length	12	17 - 19 (18)	20 - 23 (21)
Tail length	42	43 - 53 (46)	39 - 48 (44)
Spicules length			24 - 26 (25)
Lateral guiding pieces			7 - 8
Ventromedian supplements			3 - 4

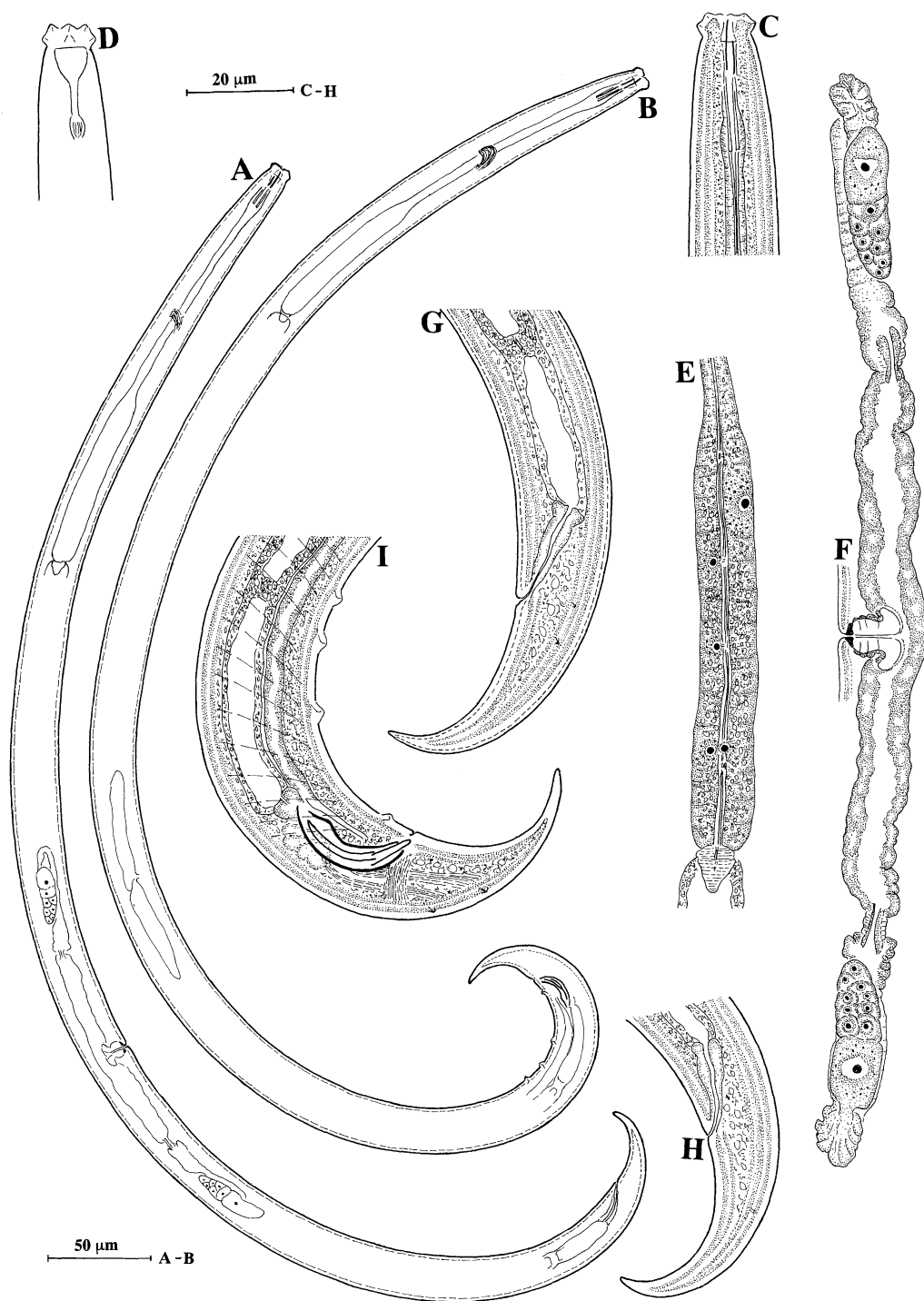


Fig. 1. *Eudorylaimus intermedius* sp. n. A: Entire female; B: Entire male; C: Anterior region; D: Anterior end showing amphid; E: Expanded part of pharynx; F: Female gonad; G: Female posterior region; H: Female posterior end; I: Male posterior region.

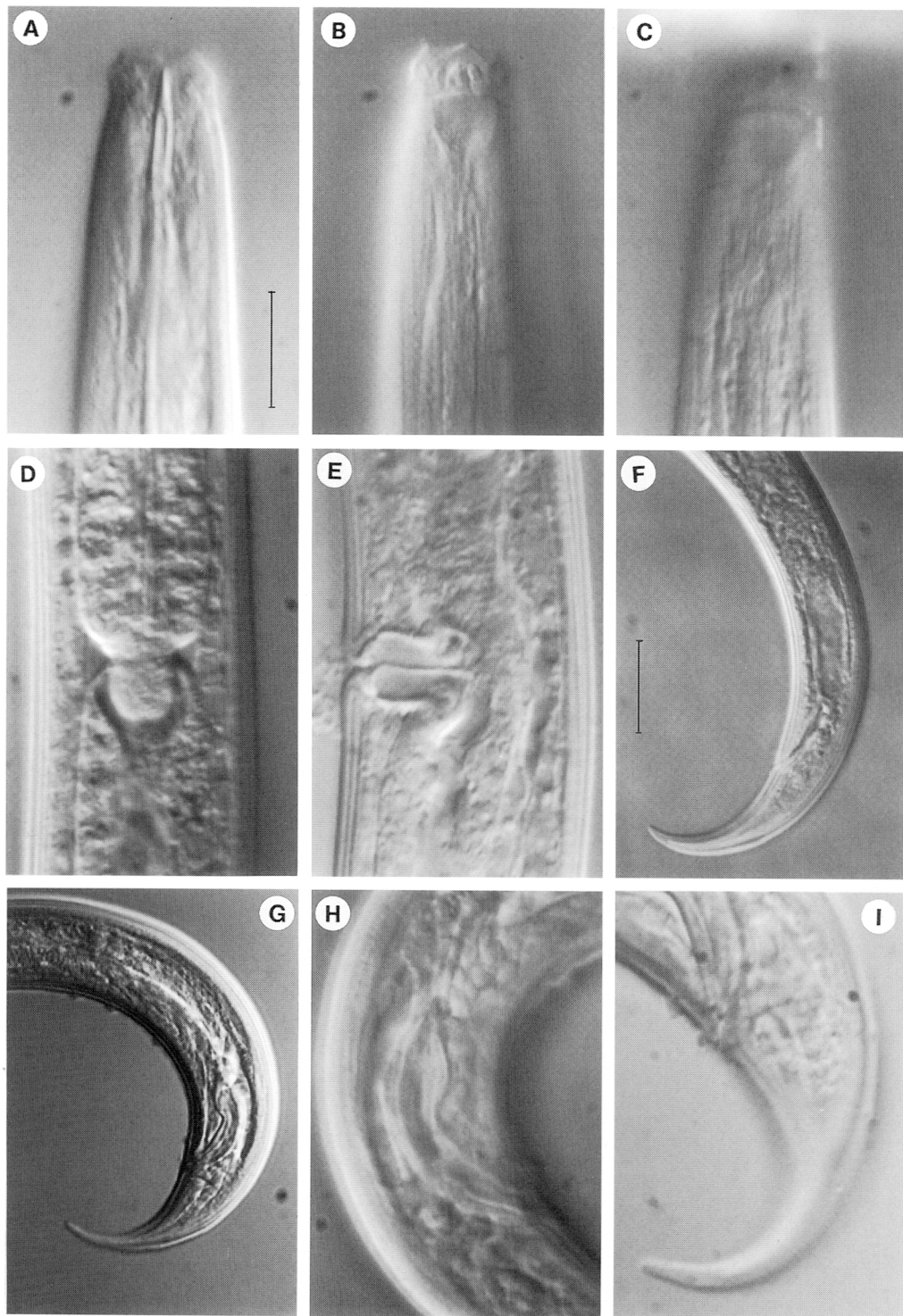


Fig. 2. *Eudorylaimus intermedius* sp. n. A: Anterior region; B - C: Anterior end showing amphid; D: Pharyngo-intestinal junction; E: Vulval region; F: Female posterior region; G: Male posterior region; H: Male cloacal region; I: Male posterior end. (Scale bar A - E, H - I = 10  $\mu$ m; F - G = 20  $\mu$ m)



Pharyngeal gland nuclei and their orifices are located as follows.

DO = 63 - 64              S1N1 = 78 - 80              S2N = 90 - 91

DN = 68 - 69              S1N2 = 83 - 85              S2O = 92 - 93

DO - DN = 4.4 - 5.8

Reproductive system amphidelphic; both the sexual branches almost equally developed. Ovary reflexed, measuring 33 - 45  $\mu\text{m}$  with oocytes arranged in a single row except the growth zone. Oviduct joining ovary subterminally, 42 - 49  $\mu\text{m}$  or 1.9 - 2.3 times the corresponding body width long with distinct *pars dilatata*. Uterus an undifferentiated tube, measuring 41 - 45  $\mu\text{m}$ . A very well developed sphincter present at oviduct-uterus junction. Sperms usually seen in the uterus as well as oviduct. Vulva transverse. Vagina spherical, encircled by circular musculature; *pars distalis vaginae* 2.0  $\mu\text{m}$ ; *pars refringens vaginae* with triangular sclerotized pieces, measuring 2.0 x 2.5  $\mu\text{m}$  and a combined with of 5.0 - 5.5  $\mu\text{m}$ ; *pars proximalis vaginae* with convex walls, measuring 9-10  $\mu\text{m}$ . Prerectum 1.6 - 2.6 anal body widths long. Rectum 1.2 - 1.4 anal body widths long. Tail conoid, ventrally arcuate, 3.1 - 3.9 anal body widths long, and with a pair of caudal pore on each side.

Male: Similar to female in general morphology, except for posterior region being more strongly curved because of the presence of 13 - 14 copulatory muscles. Spicules dorylaimoid, 1.5 - 1.7 anal body widths long. Lateral guiding pieces rod-like, about one-fourth to one-third of spicule length. Supplements, an adanal pair and three to four regularly spaced ventromedians. A precloacal space present between the adanal pair and the ventromedians. Prerectum 2.2 - 2.9 anal body widths long, terminating at level with the anterior most supplement. Rectum 1.2 - 1.4 anal body widths long. Tail conoid, ventrally arcuate, 2.6 - 3.0 anal body widths long, and with a pair of caudal pore on each side.

Type habitat and locality:

Soil around roots of forest trees from temperate deciduous forest, Ogawa Forest reserve, Kitaibaraki City, Ibaraki Prefecture, Japan.

Type material:

Holotype female on slide no. JNC/NIAEC/0020/01; paratype females and males on slides JNC/NIAES/0020/02 - 21; deposited in the nematode collection of the Nematology and Soil Zoology Unit, National Institute for Agro-Environmental Sciences, Tsukuba, Japan. A paratype female and a male deposited with the Department of Zoology, Aligarh Muslim University, India.

Diagnosis and relationships: *Eudorylaimus intermedius* sp. n. is characterized by having short ( $L = 0.76 - 0.84$  mm) and slender body ( $a = 33 - 39$ ); lip region distinctly offset; large amphid; 10 - 11  $\mu\text{m}$  long odontostyle; a post-median transverse vulva; distinctly sclerotized *pars refringens vaginae*; ventrally arcuate tail, and males with three to four ventromedian supplements and a precloacal space between the adanal pair and ventromedians.

*E. intermedius* sp. n. is an interesting intermediate form between the genera *Eudorylaimus* Andr ssy, 1959 and *Epidorylaimus* Andr ssy, 1986. In having a short and comparatively slender body, short odontostyle, and more than three anal body widths long, ventrally arcuate tail, it resembles the species of the genus *Epidorylaimus*, whereas, the presence of a transverse vulva and a precloacal space in the male puts it under the genus *Eudorylaimus*. The genus *Eudorylaimus*, being senior, the present species is assigned to this group. It would also be worth mentioning here that the males are extremely rare in *Epidorylaimus* and are recorded in only three out of thirteen known species.

According to Andr ssy's key (1986) and its revision (Andr ssy, 1991), the new species comes close

to *Eudorylaimus paucipapillatus* Andrassy, 1986 and *E. silvaticus* Brzeski, 1960. However, it differs, from the former in having shorter body (*vs.*  $L = 1.0$  mm); shorter odontostyle aperture (*vs.* aperture half of odontostyle length); posterior vulva (*vs.*  $V = 50$ ); shorter prerectum (*vs.* four times length of rectum), and longer tail (*vs.*  $c = 25$ ). From *E. silvaticus*, the new species differs, in having shorter and slender body (*vs.*  $L = 0.9$ - $1.2$  mm; body width  $38 - 57\mu\text{m}$ ;  $a = 22 - 30$ ); less lip region width (*vs.*  $14 - 15\mu\text{m}$ ); in having a well developed amphid (*vs.* obscure); shorter odontostyle (*vs.*  $16 - 17\mu\text{m}$ ); shorter prerectum (*vs.*  $43\mu\text{m}$ ); posterior vulva (*vs.*  $V = 47 - 51$ ), and in the absence of males.

As per Tjepkema, Ferris and Ferris (1971) grouping of *Eudorylaimus* species, *E. intermedius* sp. n. belongs to the Humilis group and comes close to *Epidorylaimus humilis* (Thorne and Swanger, 1936) Andrassy, 1986 (= *Eudorylaimus humilis* (Thorne and Swanger, 1936) Andrassy, 1959), but differs in having shorter and slender body (*vs.*  $L = 0.96 - 1.15$  mm;  $a = 27 - 33$ ); shorter odontostyle (*vs.*  $12 - 13\mu\text{m}$ ); posterior vulva (*vs.*  $V = 49 - 53$ ); shorter tail (*vs.*  $c = 14 - 16$ ), and in the absence of males. *E. humilis* is a widely distribute species recorded from several countries around the world but males were never found, however, in *E. intermedius* sp. n. the males are quite common, almost 50 % of the total population.

*Eudorylaimus niaesi* sp. n.

(Figs. 3 and 5A - F)

Measurements:

See Table 2.

Description:

Female: Body slightly curved ventrad upon fixation, gradually tapering towards both the extremities. Cuticle finely striated,  $3 - 4\mu\text{m}$  thick at midbody and  $4 - 5\mu\text{m}$  on tail. Lateral chords about one-third of body width at midbody. Lateral body pores indistinct; dorsal and ventral body pores visible only in the odontophore region.

Lip region offset by slight depression,  $2.1 - 2.4$  times as wide as high and about one-fourth to one-third as wide as body width at neck base. Lips comparatively amalgamated; labial papillae slightly interfering with the labial contour. Amphids stirrup-shaped; their aperture about two-fifths of the corresponding body width; fovea  $23 - 24\mu\text{m}$  behind the aperture. Odontostyle dorylaimoid,  $1.26$ - $1.36$  lip region widths long; its aperture about one-third of its length. Guiding ring single, at  $0.65$ - $0.73$  times lip region width from anterior end. Odontophore rod-like,  $1.4 - 1.5$  times the odontostyle length. Nerve ring encircling the anterior slender part of pharynx at  $32 - 34\%$  of neck length from anterior end. Pharyngeal expansion gradual; expanded part occupying  $46 - 48\%$  of total neck length. Cardia short, conoid. Dorsal pharyngeal gland comparatively more enlarged, DN measuring  $7 - 8 \times 4 - 5\mu\text{m}$ . Pharyngeal gland nuclei and their orifices are located as follows:

DO =  $56 - 57$               S1N1 =  $61 - 62$               S2N =  $88 - 89$

DN =  $71 - 72$               S1N2 =  $79 - 80$               S2O =  $91 - 92$

DO - DN =  $4.5 - 4.7$

Reproductive system amphidelphic; both sexual branches small, almost equally developed. Ovary reflexed,  $38 - 46\mu\text{m}$  with oocytes arranged in a single row except the growth zone. Oviduct joining ovary subterminally,  $61 - 70\mu\text{m}$  or  $1.2 - 1.3$  times the corresponding body widths long with distinct *pars dilatata*. Uterus characteristically small, undifferentiated tube, measuring  $25 - 44\mu\text{m}$  or  $0.5 - 0.8$  times the corresponding body widths long. Sperms not present either in uterus or oviduct. Sphincter present at

Table 2. Measurements (in  $\mu\text{m}$ ) of *Eudorylaimus intermedius* sp. n. and *Eudorylaimus kyotoensis* sp. n.

Characters	<i>Eudorylaimus niaesi</i> sp. n.		<i>Eudorylaimus kyotoensis</i> sp. n.	
	Holotype female	Paratype females; n = 6	Holotype female	Paratype female
Body length	2369	1854 - 2221 (2036)	1967	1903
Body width at neck base	57	48 - 56 (51)	50	49
Body width at midbody	62	49 - 59 (54)	51	51
Body width at anus	35	28.5 - 34.0 (31)	27	25.5
a	38	37 - 41 (38)	38	37
b	4.56	4.1 - 4.5 (4.3)	4.0	3.9
c	28	26 - 30 (27)	24	25
c'	2.38	2.3 - 2.6 (2.4)	3.0	2.9
V	48	49 - 51 (50)	55	56
G1	5	5 - 7 (6)	11	10
G2	5	5 - 7 (6)	11	11
Lip region width	14.5	14.5 - 15.0	15	15
Lip region height	6.5	6.5 - 7.0	7.5	7.5
Amphid aperture	6.5	6.0 - 6.5	9.0	9.5
Odontostyle length	20	19 - 20	23.5	22.5
Odontophore length	31	27 - 30 (29)	33	34
Guiding ring from ant. end	10	10 - 11	11	11
Nerve ring from ant end	173	147 - 160 (151)	157	156
Neck length	519	443 - 505 (467)	483	484
Expanded part of pharynx	244	198 - 238 (222)	222	224
Cardia length	18	16 - 19 (17)	20	18
Anterior genital branch	127	112 - 151 (130)	214	198
Posterior genital branch	129	119 - 146 (130)	220	205
Vaginal depth	32	26 - 35 (30)	27	26
Vulva from anterior end	1132	908 - 1115 (1013)	1083	1066
Prerectum length	89	48 - 89 (68)	70	88
Rectum length	35	29 - 34 (32)	32	33
Tail length	84	72 - 78 (75)	81	75

oviduct-uterus junction. Vulva transverse. Vagina spherical, encircled by circular musculature; *pars distalis vaginae* 3.0 - 3.5  $\mu\text{m}$ ; *pars refringens vaginae* with well developed triangular sclerotized pieces, measuring 6.5 - 7.5 x 4.5 - 5.0  $\mu\text{m}$  and a combined width of 11 - 12  $\mu\text{m}$ ; *pars proximalis vaginae* with convex walls, measuring 18 - 25  $\mu\text{m}$ . Prerectum 1.8 - 2.7 anal body widths long. Rectum about as long as anal body width. Tail conoid, ventrally arcuate, 2.3 - 2.6 anal body widths long with few subventral saccate bodies. Caudal pores two on each side.

Male: Not found.

Type habitat and locality:

Soil around roots of forest trees from temperate deciduous forest, Ashiu, Miyama Town, Kyoto, Japan.

Type material: Holotype female on slide no. JNC/NIAES/0021/01; paratype females on slides JNC/NIAES/0021/2 - 7; deposited in the nematode collection of the Nematology and Soil Zoology Unit, National Institute for Agro-Environmental Sciences, Tsukuba, Japan. A paratype female deposited with the nematode collection of the Department of Zoology, Aligarh Muslim University, India.

Diagnosis and relationships: *Eudorylaimus niaesi* sp. n. is characterized by having 1.85 - 2.36 mm long, slender body; lip region offset by slight depression; small, stirrup-shaped amphid; 19 - 20  $\mu\text{m}$  long odontostyle; exceptionally enlarged DN; transverse vulva, spherical vagina with well developed *pars*

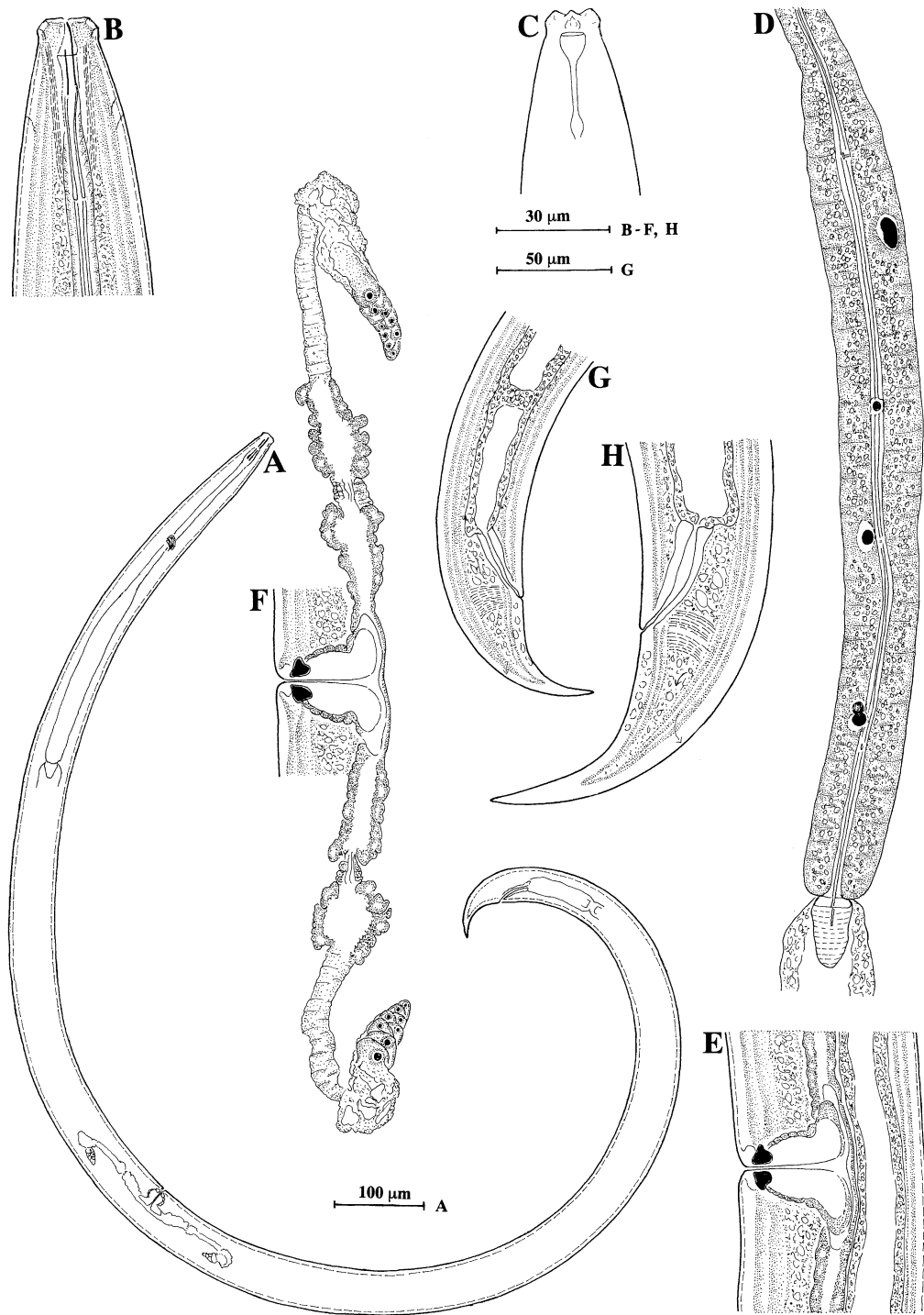


Fig. 3. *Eudorylaimus niaesi* sp. n. A: Entire female; B: Anterior region; C: Anterior end showing amphid; D: Expanded part of pharynx; E: Vulval region; F: Female gonad; G: Female posterior region; H: Female posterior end.

*refringens vaginae*; unusually small genital branches, and conoid, ventrally arcuate tail.

*E. niaesi* sp. n. is closely related to *E. lindbergi* Andr ssy, 1960 but differs in having differently shaped lip region (*vs.* lip region offset by constriction with labial papillae distinctly projecting above labial contour); longer odontostyle (*vs.* 17.6 - 18.6  $\mu$ m); less 'b' value (*vs.* b = 5.3 - 6.1); posterior vulva (*vs.* V = 44 - 46); characteristically small genital branches (*vs.* normally developed); having strongly sclerotized vagina (*vs.* vagina not sclerotized); and shorter tail (*vs.* c = 20 - 24, c' = 3.2 - 3.7).

The most characteristic feature of *E. niaesi* sp. n. is exceptionally reduced genital branches (G1 and G2 values only 5 - 7), which is very uncommon for this group among dorylaims. This reduction in size of genital branch is mainly because of reduced uterus (Fig. 3F).

*Eudorylaimus kyotoensis* sp. n.

(Figs. 4 and 5G - I)

Measurements:

See Table 2.

Description:

Female: Body slightly curved ventrad upon fixation, gradually tapering towards both the extremities. Cuticle finely striated, 3-4  $\mu$ m thick at midbody and 4-5  $\mu$ m on tail. Lateral chords about one-third of the corresponding body width. Lateral, dorsal and ventral body pores.

Lip region offset; about twice as wide as high and about one-third as wide as body width at neck base. Lips angular, separate; labial papillae slightly protruding above labial contour. Amphids large; fovea stirrup-shaped, their aperture occupying about two-thirds of the corresponding body width; fusus 22-23  $\mu$ m behind aperture. Odontostyle dorylaimoid, 1.45-1.55 times the lip region width; its aperture about one-third of its length. Guiding ring single, at 0.65-0.71 times the lip region width from anterior end. Odontophore rod-like, 1.4-1.4 times the odontostyle length. Nerve ring encircling the anterior slender part of pharynx at 32-34 % of neck length from anterior end. Pharyngeal expansion gradual; expanded part occupying 46-47 % of total neck length. Cardia elongate conoid. Pharyngeal gland nuclei and their orifices are located as follows:

DO = 56 - 57	S1N1 = 61 - 62	S2N = 87 - 88
DN = 71 - 72	S1N2 = 69 - 70	S2O = 89 - 90
DO - DN = 5		

Reproductive system amphidelphic; both the sexual branches almost equally developed. Ovary reflexed, measuring 47 - 50  $\mu$ m with oocytes arranged in a single row except the growth zone. Oviduct joining ovary subterminally, 82 - 86  $\mu$ m or 1.6 - 1.7 times the corresponding body width with distinct *pars dilatata*. Uterus an undifferentiated tube, measuring 105 - 118  $\mu$ m or 2.0 - 2.3 times the corresponding body widths long. No trace of sperms either in uterus or oviduct. Sphincter present at oviduct-uterus junction. Vulva transverse. Vagina cylindrical, encircled by circular musculature; *distalis vaginae* 1.5 - 2.0  $\mu$ m; *pars refringens vaginae* with small, trapezoid sclerotized pieces, measuring 2.5 - 3.0 x 4.0 - 4.5  $\mu$ m and a combined width of 9-10  $\mu$ m; *pars proximalis vaginae* with straight walls, measuring 22  $\mu$ m. Prerectum 2.5 - 3.4 anal body widths long. Rectum 1.2 - 1.3 anal body widths long. Tail comparatively slender, conoid, ventrally arcuate, 2.9 - 3.0 anal body widths long with subventral saccate bodies. Caudal pores two on each side.

Male: Not found.

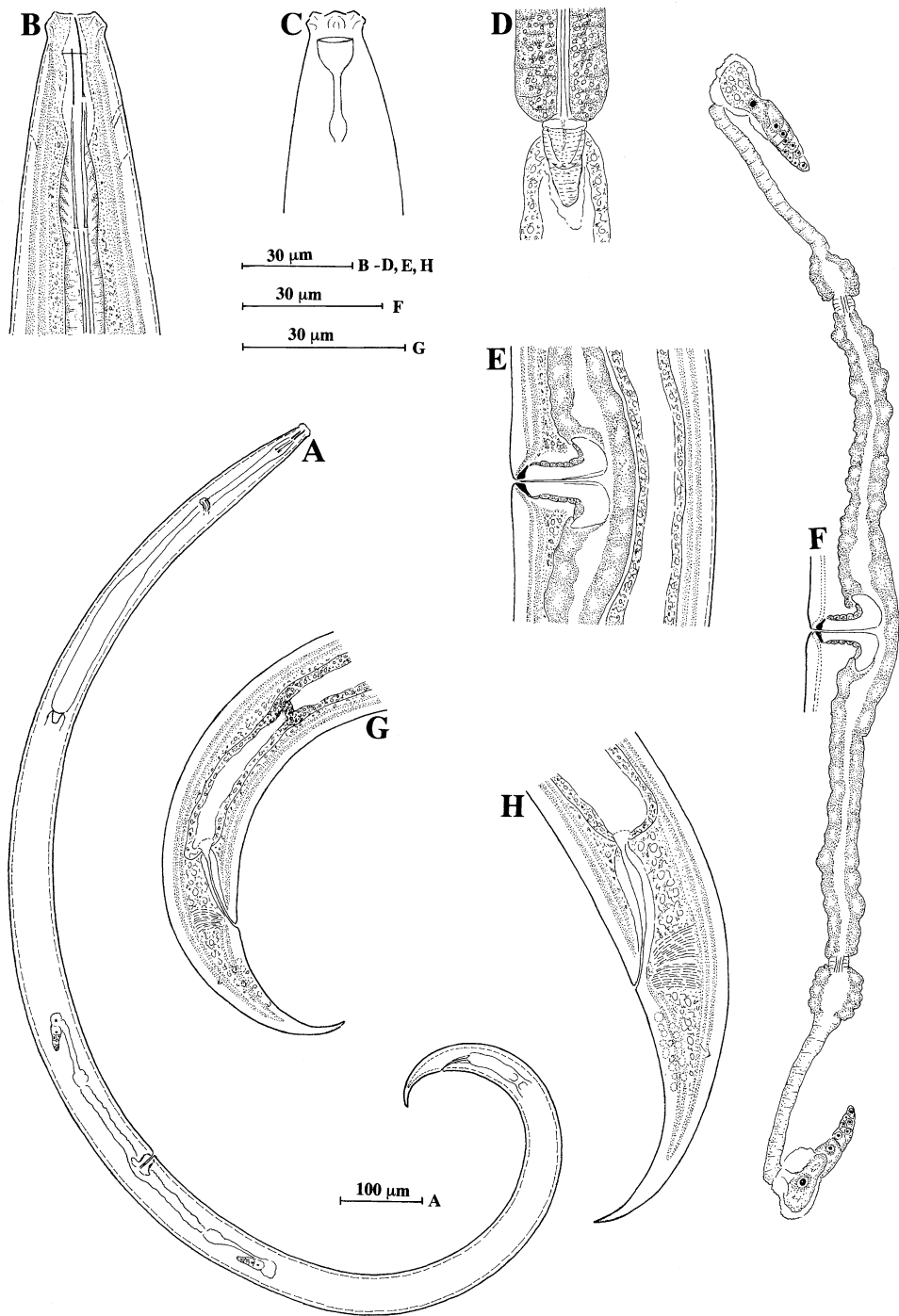


Fig. 4. *Eudorylaimus kyotoensis* sp. n. A: Entire female; B: Anterior region; C: Anterior end showing amphid; D: Pharyngeal region; E: Vulval region; F: Female gonad; G: Female posterior region; H: Female posterior end.

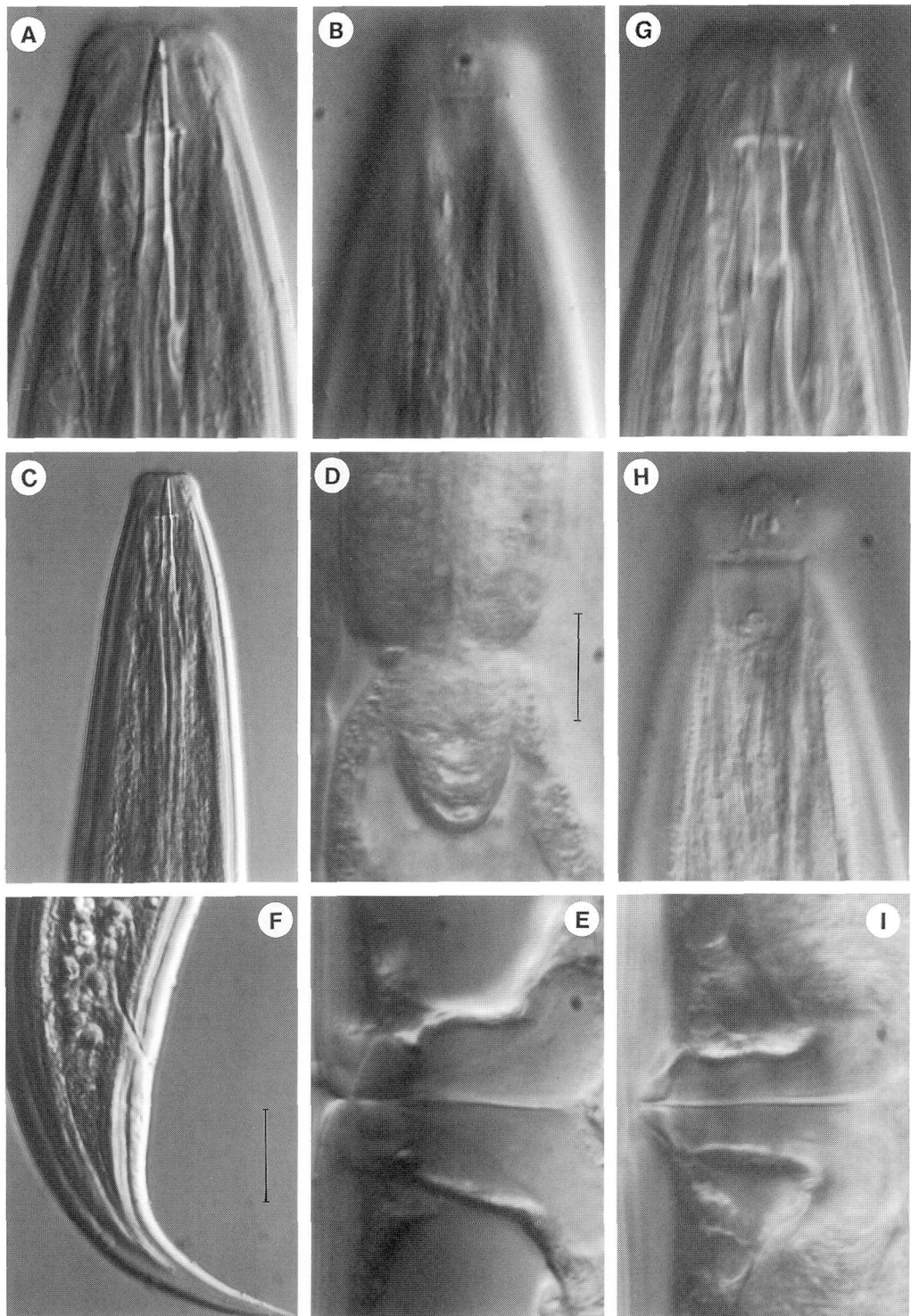


Fig. 5. A - F: *Eudorylaimus niaesi* sp. n. A: Anterior end; B: Anterior end showing amphid; C: Anterior region; D: Pharyngo-intestinal junction; E: Vulval region; F: Female posterior end. G - I: *Eudorylaimus kyotoensis* sp. n. G: Anterior end; H: Anterior end showing amphid; I: Vulval region. (Scale bar A - B, D - E, G-H, I = 10  $\mu$ m; C, F = 20  $\mu$ m).

## Type habitat and locality:

Soil around roots of forest trees from temperate deciduous forest, Ashiu, Miyama Town, Kyoto, Japan.

## Type material:

Holotype female on slide JNC/NIAES/0022/01; paratype female on slide JNC/NIAES/0022/02; deposited in the nematode collection of the Nematology and Soil Zoology Unit, National Institute for Agro-Environmental Sciences, Tsukuba, Japan.

Diagnosis and relationships: *Eudorylaimus kyotoensis* sp. n. is characterized by having 1.90 - 1.96 mm long, slender body; lip region offset by depression with projecting labial papillae; large amphids; 22.5 - 23.5  $\mu$ m long odontostyle; transverse vulva; vagina with small sclerotized pieces; well developed genital branches, and conoid, ventrally arcuate tail.

The new species is closely related to *E. niaesi* sp. n. and was even collected from the same locality but differs distinctly in some definite morphological features. The lip region in *E. kyotoensis* is not so distinctly offset as *E. niaesi*. *E. kyotoensis* has wider amphid with aperture occupying more than three fifths of the corresponding body width (*vs.* less than half of the corresponding body width); longer odontostyle (*vs.* 19 - 20  $\mu$ m); both the genital branches normally developed (*vs.* genital branches characteristically small) posterior vulva (*vs.* V = 48 - 51); in having cylindrical vagina (*vs.* spherical); in the shape and size of *pars refringens vaginae* (*vs.* *pars refringens vaginae* triangular and well developed, 6.5 - 7.5 x 4.5 - 5.0  $\mu$ m), and more c' value (*vs.* c' = 2.3 - 2.6).

From *E. lindbergi* Andr ssy, 1960, the new species differs in having wider amphid (*vs.* amphidial aperture about half of the corresponding body width); longer odontostyle (*vs.* 17.6 - 18.7  $\mu$ m); posterior vulva (*vs.* V = 44 - 46), and in the shape of tail (*vs.* posterior half of tail strongly ventrally curved).

*Paraxonchium japonicum* sp. n.

(Figs. 6 and 7)

## Measurements:

See Table 3.

## Description:

Female: Body almost straight to slightly curved ventrad upon fixation, tapering gradually towards both extremities, more so in the anterior region. Cuticle finely striated, 1.5 - 2.0  $\mu$ m thick at mid body and 3.5 - 4.0  $\mu$ m on dorsal and ventral sides of tail and 6 - 7  $\mu$ m at tail tip. Lateral chords about one-third of body width at midbody. Lateral, dorsal and ventral body pores indistinct.

Lip region rounded, offset by deep constriction, twice as wide as high and about one-fourth as wide as body width at neck base. Lips compact; labial papillae slightly protruding above labial contour. Amphids large, fovea stirrup-shaped, their aperture occupying about three-fourths of the corresponding body width; fusus 20 - 21  $\mu$ m behind aperture. Odontostyle asymmetrical, posterior half cylindrical, gradually tapering anteriorly then curved dorsally to a small aperture, 2.5 - 2.6 lip region widths long. Guiding ring single, at 0.9-1.0 times lip region width from anterior end. Odontophore simple, rod-like, 1.2 - 1.3 times the odontostyle length. Nerve ring encircling the anterior slender part of pharynx at 35 - 39 % of neck length from anterior end. Pharyngeal expansion gradual; expanded part occupying 45 - 47 % of total neck length. Cardia short conoid, about one-third of the corresponding body width long with three distinct gland cells. Pharyngeal gland nuclei and their orifices are located as follows:



Table 3. Measurements (in  $\mu\text{m}$ ) of *Paraxonchium japonicum* sp. n., *Ecumenicus monohystera* (de Man, 1880) Thorne, 1974 and *Myiodiscus nanus* Thorne, 1939.

Characters	<i>P. japonicum</i> sp. n.		<i>E. monohystera</i>	<i>M. nanus</i>
	Holotype female	Paratype females n = 6	Females n = 2	Female
Body length	744	667 - 804 (751)	770, 912	1441
Body width at neck base	32.5	32 - 35 (34)	27, 29	45
Body width at midbody	32.5	30 - 34 (33)	28, 31	49
Body width at anus	19	19 - 21 (20)	17.5, 19.5	32
a	23	21 - 24 (22.5)	28.5, 29.5	29
b	2.9	2.7 - 2.9 (2.8)	4.27, 4.26	4.4
c	26.6	25 - 31 (27)	22, 28	73.5
c'	1.46	1.25 - 1.49 (1.37)	2, 1.6	0.61
V	66	65.5 - 68.5 (66.2)	38, 39	56
G1	9	10 - 15 (11)	-	11
G2	10	8 - 12 (10)	8, 11	14
Lip region width	8	7.5 - 8.0	8	13
Lip region height	4	4.0 - 4.5	5	4.5
Amphid aperture	5	5	4	6.5
Odontostyle length	20	20 - 21	11.5, 12.0	13
Odontophore length	-	-	13.5, 14.0	23
Guiding ring from ant. end	8	7 - 8	6.5	9
Nerve ring from ant end	105	90 - 104 (99)	87, 89	114
Neck length	257	246 - 279 (263)	180, 214	328
Expanded part of pharynx	117	111 - 132 (122)	60, 84	140
Cardia length	11	11 - 13 (12)	7	8
Anterior genital branch	65	59 - 118 (83)	-	161
Posterior genital branch	74	58 - 80 (69)	65, 98	206
Vaginal depth	18	19 - 21 (20)	14	21
Vulva from anterior end	490	439 - 536 (502)	292, 355	809
Prerectum length	70	51 - 76 (62)	18, 33	65
Rectum length	26	22 - 27 (25)	22, 23	27
Tail length	28	25 - 30 (28)	35, 32	20

DO = 56 - 57      S1N1 = 66 - 67      S2N = 84 - 85

DN = 58 - 59      S1N2 = 71 - 72      S2O = 85 - 86

DO - DN = 2.8 - 2.9

Reproductive system amphidelphic; both the sexual branches almost equally developed. Ovary reflexed, measuring 29 - 46  $\mu\text{m}$  with oocytes arranged in a single row except the growth zone. Oviduct joining ovary subterminally, 23 - 37  $\mu\text{m}$  or 0.9 - 1.2 times the corresponding body width long with moderately developed *pars dilatata*. Uterus a short undifferentiated tube, measuring 25 - 33  $\mu\text{m}$  or 0.8 - 1.0 times the corresponding body width long. Sphincter present at oviduct-uterus junction. No trace of sperms either in uterus or oviduct. Vulva transverse. Vagina spherical, encircled by circular muscles, slightly more than half of the corresponding body width deep; *pars distalis vaginae* 1.5 - 2.0  $\mu\text{m}$ ; *pars refringens vaginae* with triangular sclerotized pieces, measuring 3.5 - 4.0 x 3.0  $\mu\text{m}$  and a combined width of 7.0 - 7.5  $\mu\text{m}$ ; *pars proximalis vaginae* with convex walls, measuring 14 - 15  $\mu\text{m}$ . Prerectum 2.4 - 3.8 anal body widths long. Rectum 1.2 - 1.3 anal body widths long. Tail conoid, straight with thickened wall and rounded tip, 1.3 - 1.5 anal body widths long. Caudal pores two on each side.

Male: Not found.

Type habitat and locality:

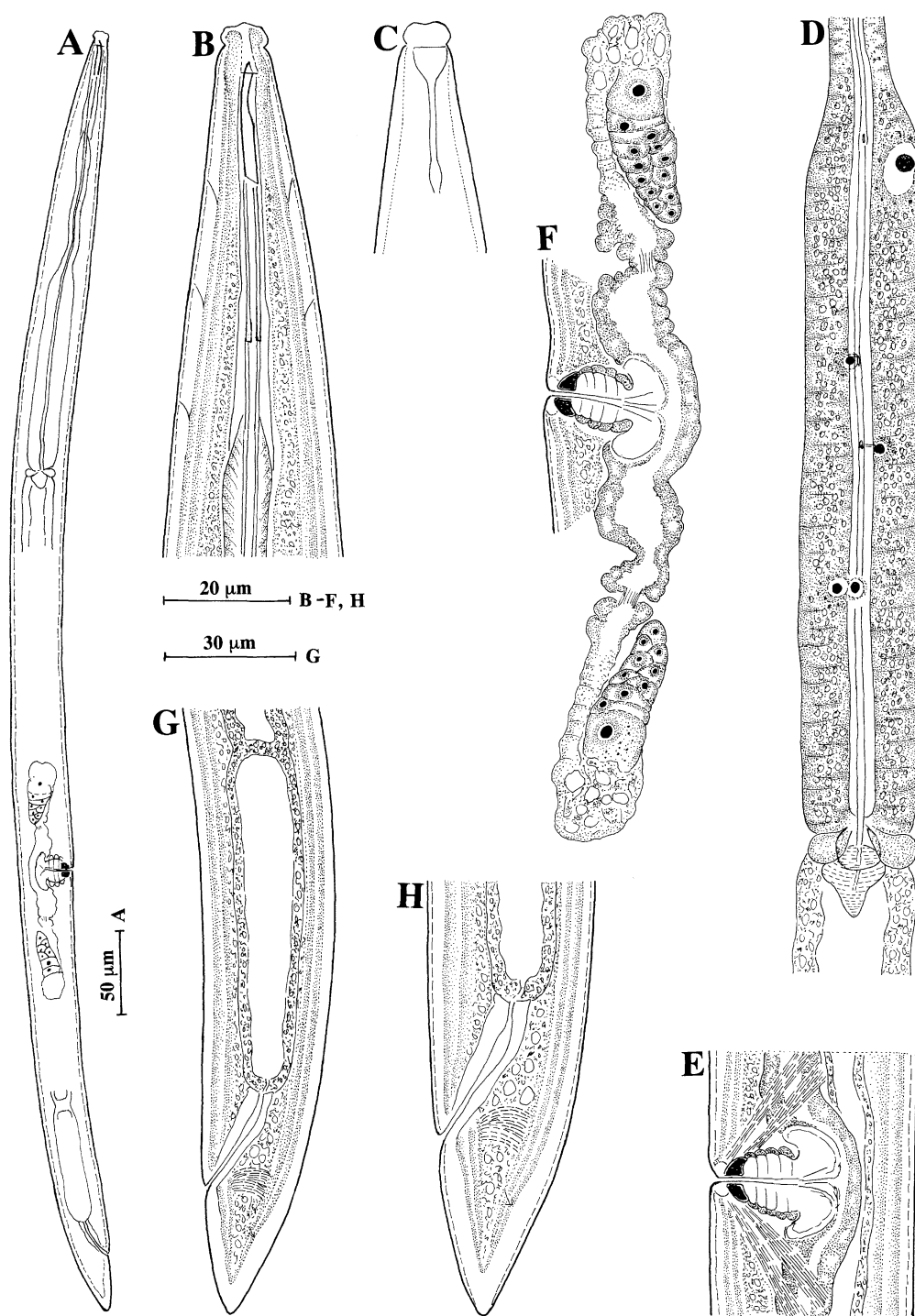


Fig. 6. *Paraxonchium japonicum* sp. n. A: Entire female; B: Anterior region; C: Anterior end showing amphid; D: Expanded part of pharynx; E: Vulval region; F: Female gonad; G: Female posterior region; H: Female posterior end.

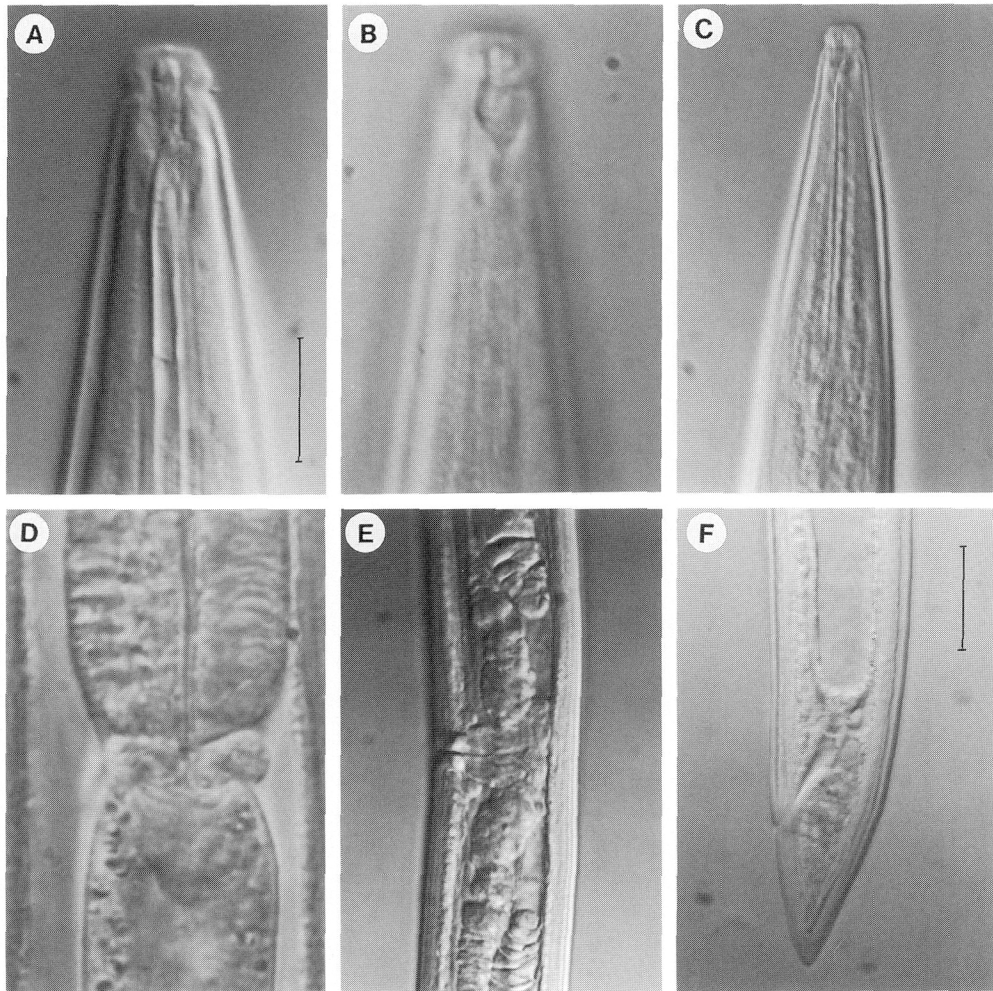


Fig. 7. *Paraxonchium japonicum* sp. n. A: anterior end; B: Anterior end showing amphid; C: Anterior region; D: Pharyngeal-intestinal junction; E: Female gonad; F: Female posterior region. (Scale bar A - B, D = 10  $\mu$ m; C, E - F = 20  $\mu$ m)

Soil around roots of tomato plant from Kannondai, Tsukuba City, Ibaraki Prefecture, Japan.

Type material:

Holotype female on slide no. JNC/NIAES/0023/01; paratype females on slides JNC/NIAES/0023/02 - 07; deposited in the nematode collection of the Nematology and Soil Zoology Unit, National Institute for Agro-Environmental Sciences, Tsukuba, Japan. A paratype female deposited with the nematode collection of the Department of Zoology, Aligarh Muslim University, India.

Diagnosis and relationships: *Paraxonchium japonicum* sp. n. is characterized by having short ( $L = 0.66 - 0.80$  mm) and robust body ( $a = 21 - 24$ ); lip region rounded, distinctly offset; large amphid; 20 - 21  $\mu$ m long, asymmetrical odontostyle with short aperture; pharyngeal-intestinal junction with three distinct gland cells; post-median transverse vulva; strongly sclerotized *pars refringens vaginae*; amphidelphic gonad and short conoid, almost straight tail.

In the presence of a short body, narrow odontostyle with short aperture, and short tail, the new species is most closely related to *P. loofi* Hodda et al., 1994 but differs in having shorter body (*vs.*  $L = 0.91 - 1.09$  mm) and less robust body (*vs.* body width  $47 - 63$   $\mu\text{m}$ ); larger amphid (*vs.* amphid aperture  $3.0$   $\mu\text{m}$  or two-fifths of the corresponding body width); less 'b' value (*vs.*  $b = 3.4 - 4.2$ ); longer prerectum (*vs.* two anal body widths); shorter tail (*vs.* tail  $34 - 48$   $\mu\text{m}$ ) and in the absence of males (*vs.* males quite common).

In the presence of a short body, the new species is also close to *P. parvus* Dhanachand and Jairajpuri, 1981 but distinctly differ in the shape and size of odontostyle (*vs.* odontostyle distinctly curved,  $15 - 18$  (m long), and the shape and size of tail (*vs.* tail  $35 - 49$   $\mu\text{m}$  long, dorsally curved,  $c = 16 - 18$ ;  $c' = 2 - 3$ ).

*Ecumenicus monohystera* (de Man, 1880) Thorne, 1974

Syn. *Dorylaimus monohystera* de Man, 1880

*Eudorylaimus monohystera* (de Man, 1880) Andr ssy, 1959

Measurements:

See Table 3.

Habitat and locality:

Soil around roots of conventional barley from Kannondai, Tsukuba City, Ibaraki Prefecture, Japan.

Remarks:

*Ecumenicus monohystera* is one of the most widely distributed dorylaim species and has been recorded from Holland, Belgium, Germany, Poland, Great Britain, Sweden, Austria, Hungary, Czechoslovakia, Romania, Yugoslavia, Spain, Italy, Russia, Ukraine, Belarus, Moldavia, Estonia, Lithuania, Georgia, Turkmenistan, Uzbekistan, Kazakhstan, Kirghizia, Tadzhikistan, Azerbaidjan, India, China, Mauritania, United States, Venezuela, Costa Rica. It is recorded here for the first time from Japan. The Japanese population fits well within the known morphological data of this species (Andr ssy, 1959; Andr ssy, I. (1991); Thorne, 1974).

*Myiodiscus nanus* Thorne, 1939

Measurements:

See Table 3.

Habitat and locality:

Soil around roots of forest trees from Teshirogi, Tsukuba City, Ibaraki Prefecture, Japan.

Remarks:

The genus *Myiodiscus* Thorne, 1939 is a monotypic genus with the only species recorded very rarely. Thorne (1939) described this species based on a single specimen collected from Indonesia. Coomans and Loof (1978) redescribed this species based on several females and juveniles collected from Brazil. Dhanachand and Jairajpuri (1980) further redescribed this species from India. Our single specimen recorded here for the first time from Japan, fits well under the known morphological and morphometric data of the species.

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## 和文摘要

本邦産Qudsianematidae科土壌線虫（ドリライムス目）の  
4新種および2未記録種の記載

Wasim Ahmad・荒城雅昭

本邦各地で採集した土壌試料から、Qudsianematidae科に属する未記載の線虫4種および2種の本邦未記録種が検出されたので記載を行った。新種*Eudorylaimus intermedius*は、体長が0.76 - 0.84 mm、口唇部が胴部からはっきりと区別され、双器が大きく、歯針長10 - 11  $\mu\text{m}$ 、陰門は体の中央からやや後よりに体を横断するように開口し、陰門環（*pars refringens vaginae*）は強く骨化すること、尾部が腹側に曲ること、雄では、前腹部補助器（ventromedian supplement）が3～4個である。新種*E. niaesi*は、体長が1.85 - 2.36 mmで細長い体を持ち、口唇部が胴部からわずかに区別され、双器は小さくあぶみ型、歯針は長さ19 - 20  $\mu\text{m}$ で、食道腺背側の核が著しく大きく、陰門の開口は横断型で、膣は球形、陰門環はよく骨化すること、前後の生殖巣の発達がともに悪く小型であること、尾部が円錐状で腹側に曲ることが特徴である。新種*E. kyotoensis*は、体長が1.90 - 1.96 mmと細長い線虫で、唇乳頭が突出して口唇部が胴部から顕著に区別され、双器は大型、歯針は長さ22.5 - 23.5  $\mu\text{m}$ 、陰門は横断型で開口し、陰門環は小型で、前後の生殖巣は発達がよく、円錐状の尾部は腹側にカーブする。新種*Paraxonchium japonicum*は、体長が0.66 - 0.80 mmの線虫としてはずんぐりした体形で、口唇部は丸く顕著で、双器は大きく、非対称な歯針は長さ20 - 21  $\mu\text{m}$ で、先端の開口は短い。食道腸間弁には大きな3つの腺細胞が付属し、陰門は体の中央から後よりに体を横断するように開口、陰門環は強く骨化し、卵巣は両卵巣型、尾部は短く円錐状、ほとんど曲らない。*Ecumenicus monohystera*と*Myiodiscus nanus*もわが国で初めて見出されたので計測値を報告した。